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ABSTRACT

A microcomputer simulation prepared for use within a masters' degree program in special education was examined with three research concerns in mind: (1) whether teachers would perceive the simulation as a viable simulation of classroom reality; (2) whether teachers using the simulation would interpret simulation descriptions similarly, or, if differently, how the differences would relate to individual teaching perspectives and pedagogical theories; and (3) whether the behaviorist ideology of the simulation design would affect the way users reacted to it, particularly those users with different ideological allegiances. An analysis is presented of the reactions to the simulation of three experienced special education teachers and two teachers in a masters' degree program in elementary education. Findings indicated that: (1) Experienced teachers were not able to perceive the microcomputer simulation as an adequate representation of school reality; (2) The teachers interpreted the simulation situations in terms of their own ideologies and teaching perspectives; and (3) The simulation did not seem to facilitate experiential learning. (JD)

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# INFLUENCE OF USERS' TEACHING PERSPECTIVES ON THEIR INTERPRETATIONS OF A MICROCOMPUTER SIMULATION

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## Introduction

The work of Eddy (1969) and Lortie (1975) demonstrated that many teachers felt their teacher education programs had been too theoretical, providing few skills and little knowledge which was of use in the classroom. Since then teacher education programs have provided students with increased time in school classrooms before student teaching in an attempt to remedy some of these problems of teacher education. Zeichner (1981-82) has pointed out, however, that little is actually known of the actual benefits of this increased time in schools. Many researchers regard at least some field-based experiences as conservative, in that these experiences serve to perpetuate existing practices and beliefs (see for example Hogben and Petty, 1979). One reason for this conservatism might be an effect of stress noted by Argyris and Schoen (1977). They observed that in stressful situations practitioners tend to fall back on old established patterns of action instead of employing patterns recently learned or as yet incompletely mastered. Certainly, attempts to employ new teaching strategies in a classroom are difficult, both for beginning and for experienced teachers.

In a recent article which outlined a reformed program of teacher education, Joyce (1984) identified factors which would facilitate the transfer of knowledge and skills learned in teacher education programs to the classroom. One such factor was the use of simulations which allowed learners to apply strategies and receive feedback about consequences of these strategies. Simulation can take many forms. One rather recent development in simulation is the use of computer-based simulation and even more recently, simulations employing microcomputers (Dennis, 1978; Northwest Regional Education Laboratory, 1981).

In this research I examined the use for teacher education of a simulation program written for an Apple II microcomputer. The simulation was prepared for use in inservice education for experienced special education teachers and for use within a masters' degree program in

special education (Lloyd, 1984). The author of the simulation had hoped that the simulation would provide experiential learning for its users. She considered that experiential learning involved action within a particular situation, the development of an understanding of that situation, the formation of a generalization or principle and the possibility for use of that generalization in a new situation.

## Research Concerns

In my research I wished to learn how well the simulation was able to engender experiential learning. Design features of the simulation lead me to identify three major research concerns. First, I wondered whether teachers would perceive this microcomputer simulation as a viable simulation of classroom reality, of students and teachers, and become involved with it as such. Second, I wondered if teachers using the simulation would interpret the simulation descriptions similarly. If there were differences in interpretations of the descriptions, I wished to examine whether and how these differences related to the teaching perspectives (Sharp and Green, 1975) and pedagogical theories-in-use (Bussis, Chittenden, and Amarel, 1976) of the users. Third, the simulation was designed within a fairly coherent behaviorist ideology which shaped the descriptions given and the choice of interventions favored. I wondered how this relative ideological homogeneity would affect the way users reacted to the simulation, particularly those with different ideological allegiances.

## The Simulation Design

This simulation was designed for use by special education teachers who worked or would work with mildly handicapped students in regular classrooms or in special resource rooms. The simulation author avoided the use of labels commonly used in special education, such as learning disabled or mildly behavioral disordered, because of the belief that the

students with mild problems "referred by regular classroom teachers have basically similar problems and that sorting done by special educators is of limited educational relevance (Idol-Maestas, Lloyd, and Lilly, 1981, p. 214).

There were a total of eighteen different problem situations in the simulation. The simulation was ordered so that users were to work through six situations in one sitting. When users went through the simulation, they played the role of a resource/consulting teacher (Idol-Maestas, 1981) new to a school. For this research I focused on the first six situations which represented student problems common to regular classroom teachers and special educators. All but one of these situations involved work with a problem student, and four also involved some cooperative work with the classroom teacher.

Each simulation situation began with a description of some difficulty. The description was stated in two or three sentences and most focused on the behaviors and/or the test scores of a problem student, e.g. the reading scores on a standardized achievement test, refusal to complete homework, lack of class participation. After the description, there were four possible options for dealing with the problem situations listed and the user was instructed to select one of these options and enter the letter of that option on the keyboard. Lloyd used a branching format in programming the simulation so the next frame displayed after the user entered her choice depended upon the choice of option made. This second frame again had two parts, description and a list of four options. The description presented consequences likely to have resulted from the first option selected by the user. The four options again presented four alternative ways to deal with the problem described.

Each situation proceeded in this fashion until the problem was successfully resolved by the user's selection of successful options. The options had been rated by an expert validation procedure and were scored +2 (optimal), +1 (good, but not optimal), - 1, (neutral or not helpful) and -2 (poor or possibly harmful). If users selected all optimal options, situations had from two to four decisions points (one

situation had two decision points, three had three decision points and two had four decision points). When users selected other than the optimal options, they were faced with more decision points, for the results of some options either failed to alleviate or worsened the initial difficulty. The simulation was programmed so that the scores of each option selected were recorded but no score was shown to the user until she completed the situation. Then she was shown her total score (the sum of the scores of all the options chosen) and her average score, the sum of the scores divided by the number of decision points. This score could range from +2 to -2.

## Methods

To address the research concerns I worked with five experienced teachers who were all enrolled in masters' degree programs in the same Midwestern university. Three teachers were in the Special Education degree program for which the simulation was designed. This program emphasized many behavioral principles. The other two teachers were in masters' degree programs in elementary education which emphasized humanistic or cognitive approaches more than behavioral approaches (see Bigge, 1982, for general descriptions of these three approaches).

I interviewed each teacher in two preliminary interviews. The first lasted one hour and the second lasted one and a half to two hours. In these loosely structured interviews (Simon, 1981) I asked teachers to describe what they did in their classrooms in order to determine conceptions they held about pedagogy. The research of Bussis, Chittenden, and Amarel (1976) and Witherell (1978) indicated that many of teachers' conceptions of pedagogy -- their notions about teaching, learning, development, human nature -- can be elicited in interviews which focus on concrete descriptions of their practices in the classroom. Bussis et al and Witherell further noted that, when observed, teachers' practices were consonant with inferences about their pedagogical conceptions based on their descriptions of their practice. These

observations lend credence to the results of such practice-oriented interviews, although in this study I did not examine these teachers at work. My concern was not so much with how they practiced as it was with the conceptions or conceptual schemes of pedagogy which they held, with their teaching perspectives.

As delineated by Becker et al (1961), a perspective develops to guide action in problematic situations. In order to analyze the transcripts of these first two interviews, I relied on dilemmas or problematic areas in schooling identified by Berlak and Berlak (1981), Tabachnick et al (1983), and Bussis et al (1976) to identify aspects which can be problematical in schooling. I characterized each teacher as to whether in fact these were considered problematical and what position she took regarding each aspect. While important to the larger research, a detailed consideration of thesecharacterizations is not essential to this repor but they will be referred to.

After the two interviews which focused on her practice, I then interviewed each teacher as she went through the six situations on the simulation. As each teacher went through the first four situations I asked only that she think aloud as she read the descriptions and made decisions about her choices. The comments made reflected thought processes used and objections to or approval of the descriptions and options given on the simulation. On the last two situations I varied the procedure. For these two situations I first asked the teacher to read the problem description only and then tell me what she would probably do in that situation. The teacher then proceeded to work through the simulation as before, although I did probe for more detailed explanations of how she made her decisions. At the end of these last two situations I asked each teacher if she could describe the "characters" in the last two situations (teacher and problem student) in any way, "as an exercise in imagination." The comments made by the teachers as they thought through the situations and as they described the characters in the last two served to clarify the different ways in which these five teachers interpreted and conceptualized these situations.

## Findings

### Adequacy of the Simulation

The teachers did not seem to perceive the simulation as an adequate representation of school reality. They all commented, with different degrees of annoyance, that there was not enough information given in the descriptions to allow them to determine "what was going on." All five, at some stage, expressed a wish to have more information about the history of the problem, the teacher and the student. The teachers were often surprised by their average scores. Four teachers expressed surprise at their scores on three situations and one was surprised by her score twice. That they were surprised suggests that they could not rely on the simulation descriptions to evaluate the efficacy of the choices they had made.

The three teachers enrolled in the special ed program for which the simulation was designed described the simulation as essentially a test, requiring them to make choices even though they felt they lacked sufficient information to feel secure in the choices they made.

The two teachers studying in elementary education, who did not expect themselves to know the "right answers," did not perceive the simulation so much as a test as an exercise to compare their thinking with that of other practitioners. They complained, though, not only about the lack of pertinent information but about the options allowed. Both stated several times that in their practice they would employ none of the options given. Their comments suggested that they perceived the simulation options as limited by the ideology of the simulation, and one teacher stated this explicitly.

### Teachers' Interpretations of the Situations

Each teacher seemed to be interpreting each situation in terms of her own teaching perspectives and conceptions of pedagogy. This difference in interpretation is to be expected anytime anyone reads something, but

the interpretations of the simulation situations were at times different enough to suggest each teacher was constructing a different reality around the situation description. To illustrate these differences in interpretation I present selections from the simulation interview transcripts regarding the last situation. These selections contain the teachers' elaborations after reading only the problem description and then after completing the situation.

The situation involved a student, Jon, who was in Mrs. Adams' fourth grade class. Jon and Mrs. Adams were characters in the first simulation situation, when Jon had reading problems. In this situation Jon is described as fidgeting, asking to get a drink, and talking to others when he was supposed to be working independently on his math. The user is asked what she would do first.

The names given in these selections are pseudonyms. The first three respondents were students in the Special Education Masters' degree program, the last two were in Masters' programs in elementary education.

On First Reading Jon's Problem

Barb reacted to the description of Jon's problem:

> Well, I'd probably do something to make him work independently. Work on his study skills, reinforce him for working independently.
> (Interviewer: A contract, like with Sara?)
> You can just come out with a plain reinforcer. You can do either. A contract is written out, which I guess I like too, both for the student and for the teacher. The student knows what's going on. Some of these reinforcer things are sort of half guesswork. You know, if he does this, I'm going to reinforce him and see if he catches on. So a contract would be a good idea.

Amy reacted:

> It sounds like a pretty easy problem. It sounds like he doesn't know his math facts. That would be a starting point, to see if he's accurately placed.

Emily reacted:

Well, seeing that Mrs. Adams and I have had some experience together with Jon and everything went fine [she recalls the details incorrectly] we have something going for us. So she will understand that I don't want to take him out of class immediately, that for now I will keep him in the classroom, see what he does, when he's more productive, when he's more fidgety, exactly what he does. So I'd observe him before I said one word.

After I'd observed I'd talk to Mrs. Adams to see that we agree on what the problem is. When I observe I'll take counts of how frequently he fidgets and talks to others and asks to get a drink and also how frequently other students do the same things. I'll discuss with Mrs. Adams whether he really has a problem and if so, what it is. Is it just that he can't concentrate on one task, that he's distractible, or that he can't do the work? I'd like to check on the accuracy of his work.

Depending on what the problem is, we'll devise some kind of program. If he needs drill, if he needs math facts, we can devise some kind of flashcard and peer tutor system. If he needs contingencies to keep him working and behaving, we can make a contingency program for behavior which she can manage. I want to be out of it as soon as possible.

Debi reacted:

O.K. Maybe I would ask Mrs. Adams if I could observe and actually see what's happening and why he's fidgeting and having problems. I would look at her technique while she's teaching . . without her being aware of it (she laughs). And see if other students also are having problems, or if it's just Jon. I would see if there were some way he could be challenged. I would observe the classroom as a whole class. That's what I would recommend.

Frances reacted:

Let him get a drink. (laughs)
Sounds like a motivational problem [said in a sarcastic expert-sounding voice]

O.K. It could be a confidence problem. If that were the case, then you would have to increase his confidence level by giving him smaller chunks of work to do and reinforcing him. It could be (pause).....the skill level. It might be too easy or too hard, in which case you'd have to adapt it.

> I think I would start by observing his behavior, looking at examples of his work. If it's simply the case that he's a fidgeter and a talker and a drinker, try giving him a quieter place to work. And if that doesn't work, set up some kind of reward system.

Description of Jon After Completion of the Situation

After completing the situations Amy described the characters readily and, in fact, reported that she had been ready to describe them even before I had asked. Emily, Debi, and Frances were more cautious about describing the characters.

Barb flatly refused to describe any characters, explaining that she felt giving images to the characters would serve to perpetuate stereotypes about pupils with problems in school. She remarked on her tendencies to form quick judgments and stereotype children and her efforts to avoid doing this. "And I think that's what taking data on kids is all about. It proves that what you assumed may not be the case."

Amy said that in this situation she had a mental image of her former student of the same name and pictured this Jon as looking just like her former student. Amy described characters in other situations in terms of their physical appearance. For example,

> Mrs. Adams was kind of middle-aged, with curly, blondish hair and glasses down here [on the end of her nose]. 'Jon, you're not completing your work [said with a school-marmish voice]. She was open to suggestions.

Emily saw Jon as

> a distractible child, most probably labeled hyperactive. They probably put him on some type of drug to make him regular. Anything that doesn't go into the box has got to be forced into it. I just love working with hyperactive kids. I love kids with their own minds, who do things their own way.

Debi described Jon:
It seemed Jon could do the work, he just needed positive reinforcement and affirmation that he could do it. A lot of children are that way it seems. Maybe he was just a little tired of the same routine and just needed variety.

Frances first recalled the two situations in which Jon had figured.

There's some possibility he's immature. I get that both from his activity in the classroom and the fact that he couldn't read with one approach but could using another. I would say that he's probably a bright or average child because when he was given the individual attention for math and when reading was structured to meet his requirements as a reader, he performed. The problem was not ability but a question of whether he sees the work as an important thing to be doing, which sometimes is a function of maturity.

These selections indicate the kinds of differences in interpretations given the situations by the teachers. A detailed analysis of the differences in interpretations is beyond the scope of this paper, but some features will be mentioned. Differences can be seen to be related to, among other things, different pedagogical conceptions or teaching perspectives, different previous personal and professional experiences.

Amy, in describing her own two years of upper elementary teaching focused primarily on the academic learning tasks prescribed by the standard curriculum of the school. Her concern was with this surface curriculum (Bussis et al, 1976) and she regarded the children primarily as students, rarely taking into account the emotional and social lives of the children to make decisions about instructional activities. By concentrating on Jon's academic achievement level, she tacitly accepted the judgment of Mrs. Adams and even though she repeated this situation twice, failed to earn a perfect score. Her "images" were generally concrete, perhaps hinting at but not employing more abstract concepts. Amy reacted to the simulation almost entirely as a test, working hard and using test-taking strategies to choose the optimal options.

In her initial interviews Barb had explained her concern to take the pupils' wishes into consideration when working with them. This concern is reflected in her preference for the use of an explicit contract rather than a simple reinforcer. In going through the simulation Barb speculate less than the other teachers, and, although noting the lack of information, did not complain as much as others. Barb also had had only six months of prior teaching experience and had worked as a speciality teacher who offered classes to students from kindergarten to senior high school. Perhaps a factor contributing to Barb's refusal to describe the characters in the simulation is her brief tenure as a teacher. Perhaps she lacked a detailed "file" of images of students to project into the situations. She was also sincerely working hard to avoid stereotyping the special education students with whom she worked who were so different from the suburban children with whom she had gone to school.

Emily had two years experience working in a junior and senior high school in a position encompassing the duties of counselor, guidance counselor, social worker, and remedial tutor. She was often required to intervene when students were having problems in a particular class or with a particular teacher. Emily also had a masters' degree in psychology from a Rogerian oriented program and some experience working as a therapist. Emily consistently responded to the simulation situations in detail, outlining data she would seek to formulate more clearly the problem. Her descriptions show an understanding of the interactional aspects of student problems, a recognition that student problems could often be related to problems of instruction or the structuring of schooling. Her final characterization of Jon as one of the "kids with their own minds" also suggests an appreciation of nonconforming students. She herself had been classified as hyperactive when in grade school.

Debi had five years of grade school teaching in a suburban school. She wished to deal with her students as whole persons, taking their emotional and social needs into consideration when organizing classroom

activities. She had strong faith in students' abilities to learn the required school curriculum, and did not mention attempts to change the required curriculum. She accomodated students' personal, emotional and social needs by selecting enrichment activities. She believed in the efficacy of the teacher's personal concern to deal with student problems, and, in fact, referred to very few other strategies to deal with students' problems. This faith in the ameliorative power of teacher's attention is indicated in her final description of Jon. In her initial description of him she does acknowledge that the teacher's behavior might contribute to Jon's problems but mentions no specific factors which could be doing so. She does mention the possibility that Jon might not be "challenged" but does not elaborate on this.

Frances had three years experience in middle elementary school and organized her classroom differently from all the others in the school. She worked hard to use an open-classroom and integrated curriculum and had made major changes in the way she structured her classroom. Her willingness to change not just activities but curriculum in response to student needs seems indicated in her initial description of Jon in which she postulated causes of his behavior and outlined ways to change the learning tasks to deal with his problems. Her description of Jon after finishing the situation also illustrates her well-articulated developmental view of children.

To summarize, it appeared that these five teachers had five different images of this problem student Jon. Barb refused to "see" anyone. Amy saw a former student of the same name and guessed this Jon did not know the material. Emily elaborated several possibilities initially, and in the end saw Jon as an independent, non-conforming student with whom she would enjoy working. Debi saw a boy who had no serious academic problems, who just needed some extra teacher attention. Frances saw a child who was capable but probably immature, needing a more carefully structured academic program than the others.

Why are these differences in interpretation of the situations important? In hoping that the simulation would produce experiential learning, Lloyd recognized the importance of understanding a particular case or situation. However, it appears from the descriptions given by these five teachers, each was elaboration on or "seeing" the situations described somewhat differently. Each user then constructed a different particular situation.

Although most users were able with some accuracy to identify principles illustrated by the situations, I argue that the problem in teacher education is not so much helping students to learn principles, theories or rules as it is helping them learn to recognize the situation to which a particular principle or rule is applicable. With this microcomputer simulation, each user seemed to be furnishing her own details about the situation, so to some degree could have been using a principle in a different context. The simulation was not helping users to understand the particulars of a situation which call forth the use of certain principles.

**Effects of the Simulation Ideology**

The descriptions of problems given on the simulation were considered incomplete or inadequate by these teachers. There seem to be three factors which contributed to the perceived inadequacy of the descriptions: the ideology guiding the simulation design, the symbol system of the simulation and the contrast between the information presented on the simulation and the kind of knowledge upon which practitioners rely.

The simulation was designed from an ideological position which favored the use of observable and measureable behaviors to describe student problems. The simulation designer eschewed the use of labels often commonly employed in special education because these had proven to be of little help in planning remediation. ( M.L. Smith, 1982, presented a detailed analysis of disadvantages attendant upon the use of some special education labels). Instead, care was taken to focus upon and

accurately describe the academic and/or school behavior problems of the students. Focus on observed behaviors, though, shifts attention from a consideration of the underlying mechanisms or interactions which could be contributing to the development of the observed behaviors. There is in educational research a strong tradition which seeks to identify the regular relationships between observed variables in the attempt to discover laws and principles. Skinner, for example, wrote:

> The scientist looks more closely at the things to which intuitive skills and wisdom apply and describes them and formulates rules and laws about them. By following rules people can act successfully without being exposed to the things that rules describe (Skinner, 1974, pp. ix,x).

Easley (1982) argued that attempts to develop this kind of scientific knowledge in education are based on a misunderstanding of the history and nature of science. He cited examples of discoveries in physical science to make the case that most scientific discoveries are made not by using measurements to discover quantitative laws but through the development of models of mechanisms which might govern the relationships observed. These models are then tested through observing quantitative regularities. Many of the teachers' complaints about the lack of information on the simulation can be interpreted as complaints about the lack of knowledge about underlying mechanisms. Of course, as the quotes above suggest, the teachers' abilities to postulate mechanisms which might be underlying the observed behaviors varied markedly.

## Discussion

The data from this research indicate that experienced teachers were not able to perceive this microcomputer simulation as an adequate representation of school reality, as an adequate simulation. They regarded it more as a test. The descriptions could be and were interpreted differently by each teacher and her interpretations were shaped by her own teaching perspective and notions of pedagogy. The ideo-

logical framework of the simulation constrained the information presented and the choice of options. All the teachers complained about the lack of information, and the teachers not sharing ideological positions in the simulation objected to the teaching strategies presented and referred to other strategies they would actually employ.

The fact that each teacher interpreted the simulation situations in terms of her own teaching perspectives suggests that the simulation could not engender experiential learning which is based upon a detailed understanding of some particular event for each user constructed her own particular event. Some of the problems with this simulation may be particular to it. However, analyses of some of the difficulties associated with its use suggest that there are more general epistemological problems with the use of microcomputer simulations similar to this one.

A design aspect of the simulation also seemed to contribute to its inadequate portrayal of school reality. In a book on educational media Schramm (1977) discussed how the symbol system used in a particular medium contributed to the educational effectiveness of that medium. Schramm distinguished between digital and iconic symbol systems. Digital systems present information linearly in an abstract fashion. Words are a digital symbol system. Iconic symbol systems, of which pictures are an example, offer concrete images, which can be interpreted to varying levels of abstraction depending upon the sophistication of the viewer. Information is presented in block, not in a linear fashion. Perhaps the digital, verbal, symbol system of the simulation was not adequate to simulate the reality of school situations with which teachers deal.

The symbol system used in the simulation presumed a kind of knowledge and knowing which appeared to be different than the knowledge and knowing upon which teachers rely in their practice. Teachers working in a school have available to them a vast amount of information. They observe their pupils at work, at play, as they interact with others and with her, they see their pupils over time and observe changes in them, they frequently know something about the homes from which the

pupils come. If we define knowledge as "interpreted experience" (Luckmann, 1983) teachers have many experiences which can be formed into knowledge about pupils. Eraut (1982) used a metaphor for the knowledge teachers have of their pupils. He referred to teachers forming "film clips" of their pupils, film clips which feature the pupil in many different contexts and at different times. Measures of pupil performance such as test scores or amount of time off-task Eraut likened to snap shots. It is very difficult, if not impossible, to generate a film clip from one or two snap shots, and this is what the simulation required of its users.

The simulation relied on such descriptions as test scores, percent of time off task, or a child's refusal to complete homework or participate in class, and offered neither contextual nor historical detail. These contextual and historical details would give meaning to the descriptions offered in the simulation. Comparing the descriptions given by the five teachers suggests how each was able to give different meanings to the simulation descriptions by assuming different contexts and histories.

The simulation then did not seem to facilitate experiential learning. Ideological and design constraints limited the description given so that it was not like the knowledge which teachers rely on in their practice. Could there be other uses for this simulation?

Writers who take the view that practitioners are guided in their practice by theories or beliefs also accept that these theories or beliefs may be unarticulated and tacit (e.g. Fenstermacher, 1980; Argyris and Schoen, 1977). To change practice, to improve it, an important step then is the surfacing of these tacit theories (theories-in-use as Argyris and Schoen called them, subjectively held beliefs as Fenstermacher called them). As the experienced teachers worked through the simulation situations it appeared that the simulation served as an ambiguous stimulus which they interpreted according to their own theories of teaching. This simulation might well be effectively used to help users surface some of their less articulated

theories. An interviewer or another teacher could work with users to elaborate on their descriptions of the situations, could ask for explanations of statements made. The simulation could function as a thematic apperception test.

If this were done within a group, each situation could serve as an impetus for a detailed discussion which could help teachers examine their own beliefs. One possible standard question which could be asked is "Teachers generally wish for more information about this situation in order to decide upon options. What additional information is important? Why?" Discussion of the simulation could be especially illuminative if there were teachers with contrasting perspectives within the group who would differ in their judgments as to the worth of the options. Discussion about the efficacy of different options could help teachers to elucidate some of the conditions in which particular strategies would be likely to be useful.

Schoen argued that good practitioners rely on many cues in their thinking during and about practice, albeit not always with conscious awareness of doing so. A discussion such as the one suggested could serve two purposes. It could help better practitioners more consciously to realize the cues they rely on. This would help in the demystification of practice (Schoen, 1983). This could also help less able practitioners recognize the greater variety of possibly relevant cues to which they might attend in producing judgments.

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